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**REMARKS**

Claims 1-4 and 7-8 remain in the case. Original claims 1-9, 11-14, and 16-19 were rejected under 35 USC § 102 over USPN 5,236,868 to Nulman. Original claims 10, 15, and 20 were rejected under 35 USC § 103 over Nulman in view of USPN 6,077,781 to Guo et al. Claim 1 has been amended to include the limitations of claims 5-6 and 10, and claims 5-6 and 9-20 are hereby cancelled. No new matter has been introduced by the amendments, which are supported by the disclosure of the original claims and the specification. Reconsideration and allowance of the claims are respectfully requested.

**CLAIM REJECTIONS UNDER §102**

Remaining claims 1-4 and 7-8 are rejected under 35 U.S.C. 102 as being unpatentable over Nulman. However, claim 1, from which all remaining claims depend, has been amended to include the limitations of original claims 5-6 and 10. As original claim 10 was rejected under a combination of references, the rejection of the claims is discussed in the next section.

**CLAIM REJECTIONS UNDER §103**

Original claim 10 was rejected under 35 U.S.C. 103(a) as being unpatentable over Nulman in view of Guo et al. Independent claim 1 has been amended to include the limitations of original claim 10, and therefore claims, *inter alia*, a method of processing a substrate, where the substrate is transferred from an ambient environment to a clean environment, where it is heated and processed before being transferred back into the ambient environment. As a part of the process, the substrate is heated to and maintained at at least a first temperature of between about one hundred and fifty centigrade and about three hundred and fifty centigrade. The substrate is selectively transferred within the clean environment to at least four processing chambers, including (1) initially heating the substrate in a degassing chamber, (2) etching the substrate in an etch chamber to form a via, (3) depositing a layer of titanium within the via in a first deposition chamber, and (4) depositing a layer of titanium nitride over the layer of titanium in a second deposition chamber.

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Thus, claim 1 recites many different limitations, including four processes (heating, etching, depositing titanium, depositing titanium nitride), four chambers (degas, etch, first deposition, second deposition), and two specific conditions (temperature of the substrate does not drop below the first temperature, and the substrate is not removed from the clean environment during processing). The combination of Nulman and Guo et al. do not describe such a process, nor do they make such a process obvious.

Nulman describes a method for forming titanium nitride. As a part of the process, a substrate is kept in a clean environment while it is sequentially cleaned with a radio frequency plasma, a layer of titanium is deposited, the titanium is annealed in a nitrogen atmosphere in a first temperature range for a first time, and the titanium is then annealed in the nitrogen atmosphere in a second temperature range for a second time, whereby all of the titanium is converted to stoichiometric titanium nitride. The titanium nitride layer is then etched.

Thus, both the processes and the chambers as described by Nulman are very different from those described in claim 1. For example, Nulman describes depositing titanium and then converting all of the titanium to stoichiometric titanium nitride. Claim 1 recites etching a via, depositing titanium, and then depositing titanium nitride on top of the titanium. Thus, the processes claimed in claim 1 and the processes described by Nulman are very different.

Similarly, there are differences between the apparatuses used to accomplish the method as recited in claim 1 and the method described by Nulman. Nulman describes a degas chamber, a plasma clean chamber, a titanium deposition chamber, and an anneal chamber. Claim 1 recites a degas chamber, an etch chamber, a titanium deposition chamber, and a titanium nitride deposition chamber. Thus, different structure is used to accomplish the two very different methods as described by Nulman and recited in claim 1.

Further, Nulman does not at any point state that the temperature of the substrate is to remain at at least a given temperature. Nulman is very careful to state that the substrate is not exposed to air or oxygen when transferred from process to process. Therefore, it is reasonable to expect that if Nulman had any concerns about the temperature of the substrate between processing, he would have mentioned that the

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temperature should also be maintained. As Nulman is completely silent as to any such limitation, it is clear that Nulman does not disclose or otherwise suggest any such limitation. The present method as recited in claim 1, however, makes it very clear that the temperature is to be maintained at no less than the first temperature range.

Guo et al. do not remedy the deficiencies of Nulman. Guo et al. describe a method for depositing aluminum into a via. Thus, Nulman and Guo et al. describe completely different processes, with Nulman describing the formation of titanium nitride barriers on the upper surface of an integrated circuit and Guo et al. describing filling a via with aluminum. Applicants assert that, because of their vast differences, there can be no logical combination of Nulman and Guo et al., as describe in more detail in the following section. However, even so the combination of Nulman and Guo et al. fails to describe the present invention as claimed in claim 1. Most pointedly, Guo et al. specifically teach that the substrates are to be cooled during processing (column 7 line 14), which is completely contrary to what is claimed in claim 1. Further, Guo et al., like Nulman, are completely silent as to lining a trench with a first layer of titanium and then a second layer of titanium nitride.

Thus, neither reference describes etching a via, depositing a layer of titanium in the via, and then depositing a layer of titanium nitride in the via. Further, neither reference describes maintaining the temperature throughout such processing.

Therefore, claim 1 as amended patentably defines over Nulman in view of Guo et al. Reconsideration and allowance of claim 1 are respectfully requested. Dependent claims 2-4 and 7-8 depend from independent claim 1, and contain additional important aspects of the invention. Therefore, dependent claims 2-4 and 7-8 patentably define over Nulman in view of Guo et al. Reconsideration and allowance of dependent claims 2-4 and 7-8 are respectfully requested.

#### COMBINATION OF REFERENCES

It is respectfully submitted that the references cited do not support combining the elements as claimed in the present invention. *In re Bond*, 910 F.2d 831, 15 U.S.P.Q.2d (BNA) 1566 (Fed. Cir. 1990) states that the PTO erred in rejecting a claimed invention as an obvious combination of the teaching of prior art references when the prior art

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provided no teaching, suggestion, or incentive supporting the combination. *See Northern Telecom Inc. v. Datapoint Corp.*, 15 U.S.P.Q.2d 1321, 1323, *In re Geiger*, 2 U.S.P.Q.2D 1276, 1278. *SmithKline Diagnostics, Inc. v. Helena Laboratories Corp.*, 859 F.2d 878, 887, 8 U.S.P.Q.2d (BNA) 1468, 1475 (Fed. Cir.1988) states that one "cannot pick and choose among the individual elements of assorted prior art references to recreate the claimed invention."

There is nothing in the prior art cited to lead a person of ordinary skill to design a process like that of the present invention, other than the hindsight knowledge of this invention. For example, there are many, many different process steps and structures described by both Nulman and Guo et al. These different steps and structures could all be snipped apart and recombined in a nearly endless list of different processes. However, the fact that such a dissection and rearrangement could be done, does not imply that all such fabrications are made obvious by the two references. There must be an obvious incentive – recognizable in advance and on the face of the references – in order to make a given combination obvious.

The office action recites certain generalized benefits (realized in hindsight after considering the invention) as motivation for the combination of the references. However, these generalized motivations do not make obvious the combination of the references to produce the claimed invention. Only after considering the invention is it understood that combining the references (and adding a great deal more) tends to produce the motivating elements.

This, however, does not satisfy Section 103. The motivation to combine references cannot come from the invention itself. *See In re Oetiker*, 24 U.S.P.Q.2D 1443, 1446. The claims of the present application appear to have been used as a frame, and individual parts of separate prior art references were employed to recreate a facsimile of the claimed invention. *See W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 220 U.S.P.Q. 303, 312. There is no explanation of what there was in the prior art that would have caused those skilled in the art to combine the references.

The examiner has the burden to show some teaching or suggestion in the references to support their use in the particular claimed combination. *Uniroyal Inc. v.*

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*Rudkin-Wiley Corp.*, 5 U.S.P.Q.2D at 1438-1439. In the absence of such, applicants respectfully suggest that the references are improperly combined.


#### CONCLUSION

Applicants assert that the claims of the present application patentably define over the prior art made of record and not relied upon for the same reasons as given above. Applicants respectfully submit that a full and complete response to the office action is provided herein, and that the application is now fully in condition for allowance. Action in accordance therewith is respectfully requested.

In the event this response is not timely filed, applicants hereby petition for the appropriate extension of time and request that the fee for the extension be charged to deposit account 12-2355. If other fees are required by this amendment, such as fees for additional claims, such fees may be charged to deposit account 12-2252. Should the examiner require further clarification of the invention, it is requested that she contact the undersigned before issuing the next office action.

Sincerely,

LUEDEKA, NEELY & GRAHAM, P.C.

By: 

Rick Barnes, 39,596

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